GPS – Galileo Cooperation Agreement

Presentation to CGSIC

Long Beach, CA

September 20, 2004

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GPS-Galileo

- Each system managed, operated, and funded independently
- GPS and Galileo will be compatible and, for civil users, interoperable at the user level
  - Geodesy nearly identical ~ 2cm
  - Timing different but each system will transmit timing offsets
  - Radio frequency compatible
- Level playing field allows manufacturers to build “dual system” civil receiver
  - Civil users can choose to use GPS, Galileo, or combination based on their needs

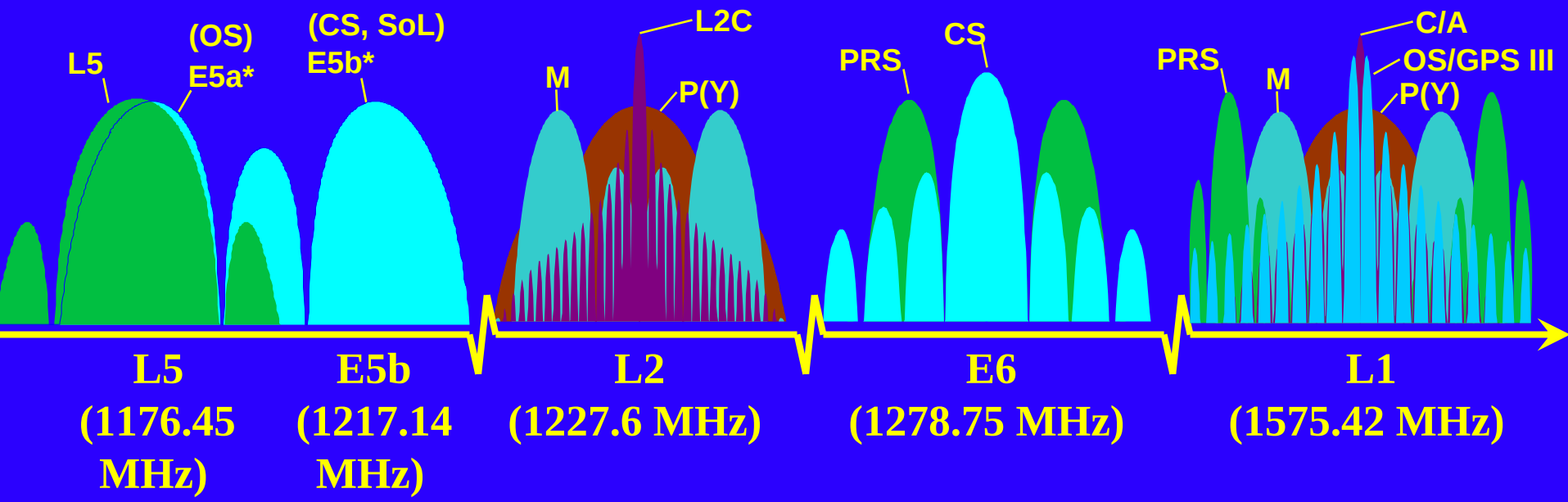
National Security Compatibility

- EC agreed to use signal structures for Galileo PRS and Open Service signals that satisfy national security compatible criteria
  - Criteria, assumptions and methodology contained in reference documents signed by both sides
  - Consultations required if one Party changes signal structure and the Party believes it exceeds the criteria

GPS-Galileo

- **Agreed to baseline signal structures for L1**
  - **Common BOC(1,1) signal – broadcasted by up to 60 satellites**
  - **GPS will continue to broadcast C/A code as well as BOC(1,1) for GPS III**
  - **Galileo PRS at BOC(15,2.5) cosine phase modulation**
- **Each system's signals will be compatible with the other systems**
  - **They will "do no harm" to the other system's**
- **Civil signals will be interoperable**
  - **A "dual system" receiver should be able to use any combination of GPS and Galileo signals to derive a solution**

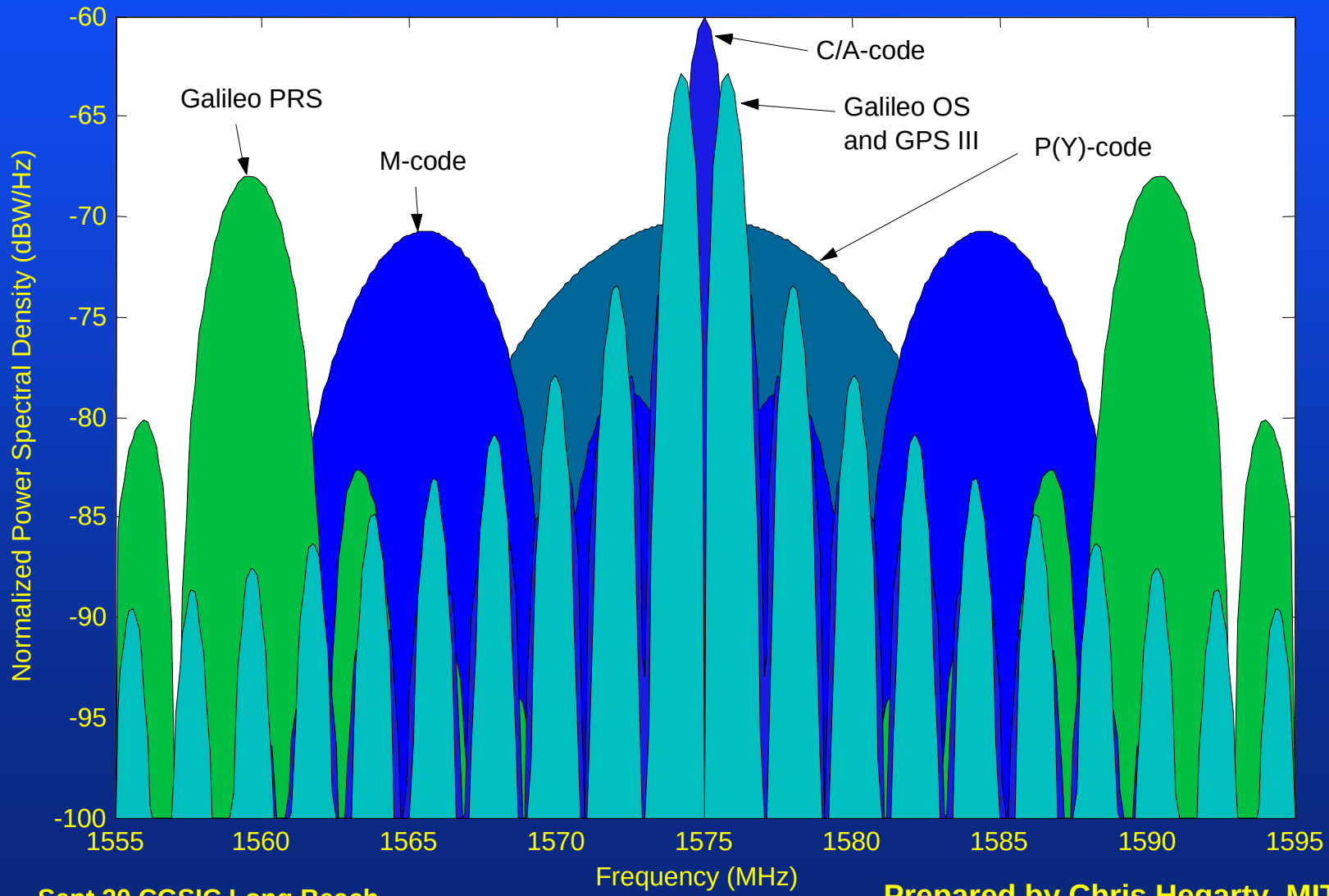
GPS and Galileo Signal Spectra



*BOC(15,10) modulation option shown for E5a/E5b.

Prepared by Chris Hegarty, MITRE

GPS and Galileo L1 Signal Spectra



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Planned Baseline GPS and Galileo Signal Structures

- **GPS Service**
  - **L5 – BPSK-10 centered at 1176.45 MHz [2006]**
  - **L2 – BPSK-1 centered at 1227.6 MHz [2005]**
  - **L1 – BPSK-1 centered at 1575.42 MHz [current] with an added BOC (1,1) [GPS III]**
- **Galileo***
  - **E5A/E5B – 2 x BPSK-10 or BOC (15,10) between 1164-1214 MHz**
  - **E6 – BPSK-5 & BOC (10,5) centered at ~ 1279 MHz**
  - **E2/L1/E1 – BOC (1,1) OS BOC (15,2.5) cosine phased PRS centered at 1575.42 MHz**

***(based on US/EC draft agreement & Galileo plans as currently understood by the U.S.)**

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- **Open service signals provided without direct user fees and signal specification information available on a non-discriminatory basis**
  - **Access to information for manufacturers may be subject to non-discriminatory commercial arrangement**
  - **GPS civil service specifications will continue to be open and publicly available – no licensing fee**
- **Encrypted civil signals (i.e. Galileo Commercial and potentially Safety-of-Life) may be subject to a licensing fee**
  - **Parties shall endeavor to provide signals intended for safety of life services with the required level of safety as recognized by competent international bodies.**

GPS-Galileo

- Any fees for Safety-of-life services for aviation and maritime will be consistent with ICAO and IMO rules
  - GPS civil services will continue to be free of direct user fees
- Sets up working groups
  - Trade and civil applications
  - Radio frequency compatibility and interoperability
  - Design and development of next generation
  - Security
- No transfer of technology to third parties without permission of originating party

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- **Consult prior to establishing standards, certification or licensing requirements, or regulations**
  - **Unless mandating expressly authorized by ICAO or IMO**
  - **U.S. supports users' ability to choose the service or services that best meets their requirements**
- **Non-discriminatory approach to trade in goods & services**
  - **Measures with respect to goods and services related to civil satellite-based navigation and timing signals or services, augmentations, and value-added services should not be used as a disguised restriction on or an unnecessary obstacle to international trade**

Summary

- Cooperation agreement addresses national security, economic, and technical issues
- Protects compatibility
- Encourages civil interoperability